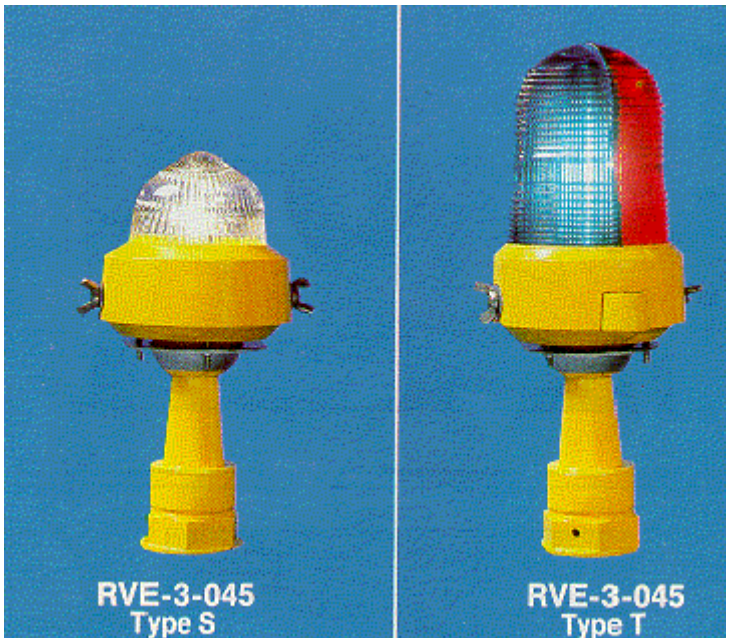
Instruction Manual

ADB
Airfield Solutions

AM.03.150e – Edition 1 – Rev 2

Medium Intensity Omnidirectional Elevated Light



Type
RVE – 3 - 045

RECORD OF CHANGES

Revision	Page	Description	Checked	Approved
1	27	Modification §4.1	CME	-
2		Rebranding	EV	12/09

SAFETY INSTRUCTIONS

SAFETY PRECAUTIONS

The operating and maintenance personnel should refer to the maintenance procedures described in the ICAO Airport Service Manual, Part 9, Airport Maintenance Practices and in FAA Advisory Circular AC 150/5340-26 "Maintenance of Airport Visual Aid Facilities" for instructions on safety precautions. Personnel must observe the safety regulations at all times. While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed.

KEEP AWAY FROM LIVE CIRCUITS

Operating and maintenance personnel must at all time observe all safety regulations. Do not change neither lamps nor components or make adjustments inside equipment with the light circuit ON. See FAA Advisory Circular AC 150/5340-26 concerning safety.

RESUSCITATION

Operating and maintenance personnel should familiarise themselves with the technique for resuscitation found in the First Aid Instruction Manual.

USE RESTRICTION NOTICE

This instruction manual is the property of

ADB
585 Leuvensesteenweg
B-1930 Zaventem
Belgium

GUARANTEE

ADB. undertake to remedy any defect resulting from faulty materials or workmanship appearing during a period of one year after date of shipment. Exclusive lamps or any defect developing as a result of improper use or handling.

Repair and replacement will take place in our factory. Such correction shall constitute the limit of our liabilities with respect to equipment.

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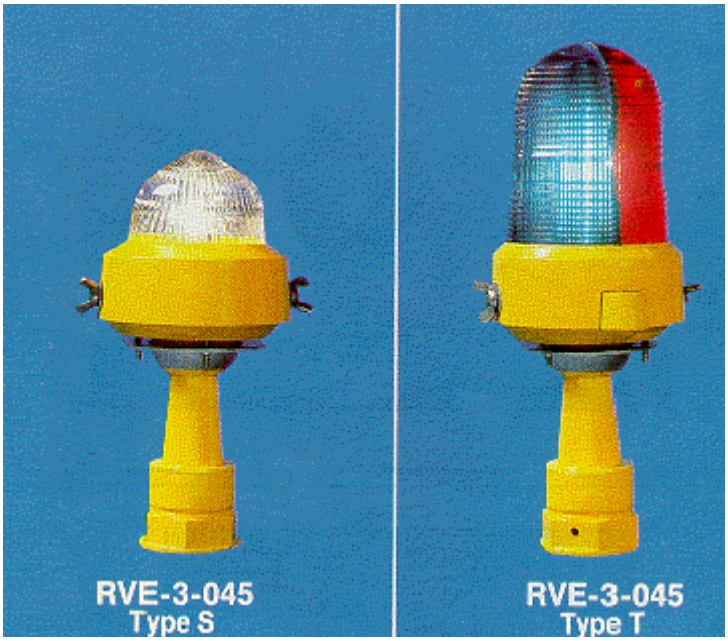


Fig. 1
RVE-3-045

SECTION 1

GENERAL INFORMATION AND REQUIREMENTS

1.1. INTRODUCTION

The RVE-3-045 (fig. 1) Medium Intensity Omnidirectional Elevated Light, is used to delineate the approaches, thresholds, edges, and runway ends of runways at airports without non-visual precision approach aids, taxiway edges, holding bays and aprons. The RVE-3-045 is designed for either stake mounting conduit elbow mounting or mounting on an L-867 base. The base mounting is advantageous from a maintenance standpoint and provides added protection for equipment. Stake mounted RVE-3-045 lights use transformers, cables and connectors designed for direct ground burial.

1.1.1 Purpose

This manual describes procedures for the installation, maintenance, and troubleshooting of the RVE-3-045 Medium Intensity Omnidirectional Elevated Light.

1.1.2 Scope

This instruction manual covers equipment manufactured in compliance with FAA specification AC 150/5345-46A, and ICAO Annex 14 Volume I for lighting of non precision approach runways and taxiways, ICAO Annex 14 Volume II for lighting on heliports and STANAG 3652.

1.2 DESCRIPTION

The frame of the RVE-3-045 (Fig. 11) consists of a cast aluminium alloy frangible stem (8) fitted with a 2" - 11 TPI thread on its base, on which a ball joint device (6 & 7) enable the setting and levelling of the optical system.

The optical system is composed of a upper and lower body (1,5), the upper body (1) is a blue dome cast in an aluminium alloy ring which covers completely the lampholder (3) up to the lower body (5) providing like this watertightness without use of a gasket.

Two lateral thumbscrews and washers (10) secure the upper body on the lower body.

The lower body, on its top part sustain the lampholder secured by two screws, a lead assembly for connection of the lampholder to the two-pole plug (9) is secured on the lower body by a strain relief bushing to avoid pulling on the connection to the socket, and to help disconnecting the plug in case of impact.

The lower part of the lower body (5) is half spherical shaped adapted to the polyester ball joint (6) sticked on the frangible stem. This knuckle-joint is locked on the lower body, thanks to three screws (11) and a clamp (7) below the split ball. This genuine knuckle-joint avoids the counter clockwise wires twisting problem during installation and maintenance. The lower body and the ring of the blue dome are made of an aluminium alloy.

A weakening groove is provided at the lower part of the frangible stem to eliminate the need of a separate breakable coupling. Between the groove and the thread, an hexagonal shaped part is provided to tighten or loosen the light unit from the ground mounting device (base, conduit elbow, anchor stake).
All the aluminium castings are phosphatized and protected with an aviation yellow electrostatic polyester powder coating. The lower body is fitted with a flag-holder to locate the light with a flag in countries with heavy snowfalls.

1.3 USE

The ADB RVE-3-045 elevated light is designed for the lighting of non precision approach runways, or taxiway and apron edges serving runways of all categories.
Fig. 2 shows a typical layout of a non precision approach runway.

1.4 EQUIPMENT SPECIFICATION DATA

1.4.1 The ADB ordering code is given in Table 1-1 for the RVE-3-045.
Reference data pertinent to the equipment is listed in Table 2.
Information on items not supplied which might be required for installation is given in Table 3.

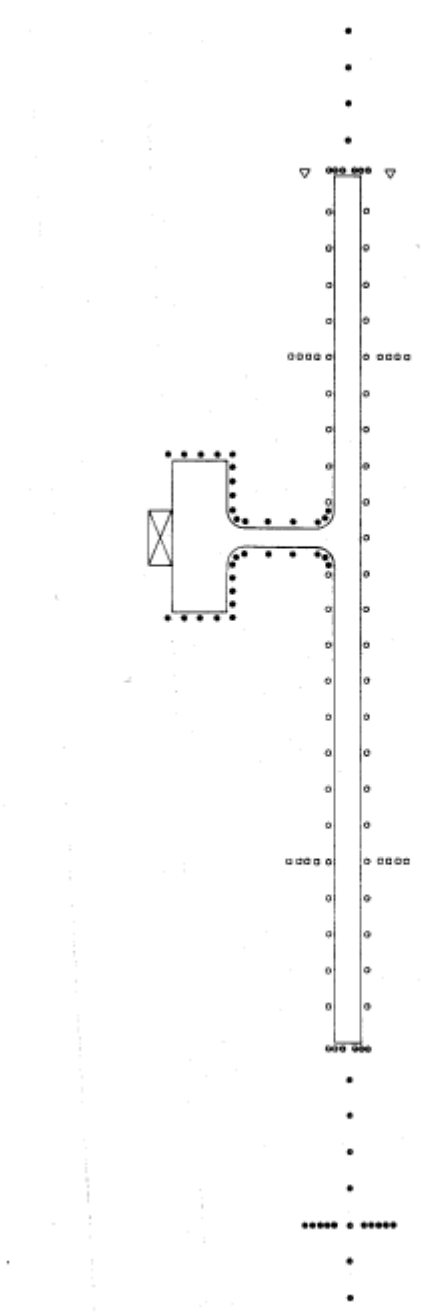


Fig. 2
RVE-3-045 : Typical layout for non precision approach runway

Table 1 : RVE-3-045 - ordering code

RVE - 3 - 045 - C/C - S

- Medium Intensity
  Elevated light:

- Lamp : 6,6A - 30W : 030
  6,6A - 45W : 045

- Colour**:

360 deg. clear	: C/C
360 deg. green	: G/G
360 deg. red	: R/R
360 deg. yellow	: Y/Y
360 deg. blue	: B/B
2x180 deg. clear/red	: C/R
2x180 deg. red/green	: R/G
2x180 deg. clear/yellow	: C/Y
2x280 deg. yellow/red	: Y/R
2x180 deg. clear/green	: C/G
2x180 deg. green/black	: G/N
2x180 deg. green/red*	: G/R
2x180 deg. yellow/clear*	: Y/C
2x180 deg. black/green*	: N/G

* only with T-type lens

- Type of lens
  - Type S omnidirectionnal lens : S
  - Type T omnidirectionnal lens : T

** S-type lenses other than clear and yellow only for use with 30W lamps

Table 2 : Equipment data

Type : RVE-3-045

Input : 6.6A
Lamp : 30W or 45W/6.6A - EXL, quartz
Rated lamp life : 1000 hours
Temperature range of installation : -55°C (-67°F) to +55°C (+131°F)
Humidity : Up to 100%
Altitude : sea level to 3000 m
Wind : Velocities up to 560 Km/h
Dimensions : See figure 1-3
Net weight : approx. 1,2 kg (Type S) and 1,4 kg (Type T)
Degree of protection: IP23

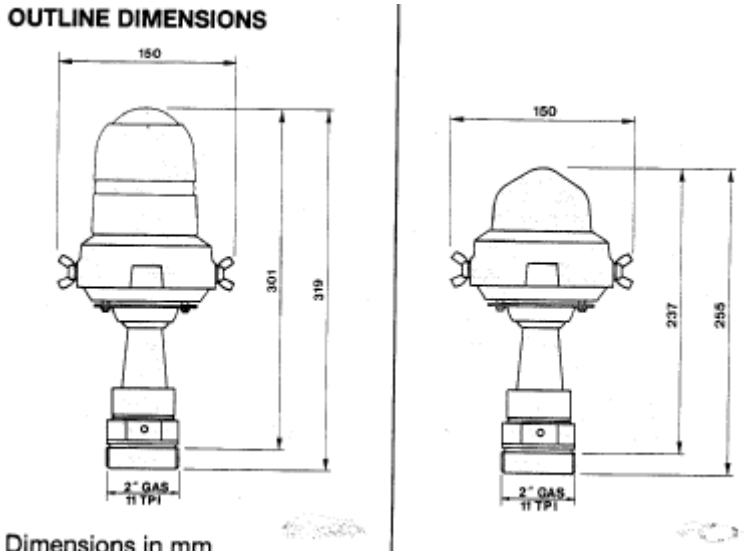


Fig. 3
RVE-3-045 : outline dimensions

Table 3 : Equipment required but not supplied

Quantity	Description

1	Spanner 2" open ended
1	Ratchet, lever reversible (3/8") n° 435
1	Torque wrench (5-50Nm) n° 730/5 with
1	Square drive insert tool (3/8") n° 734/5
1	Socket n° 45a - 9/16 (3/8")
1	Water level
A/R	Loctite Grade AV or equivalent
	1T300/2 base plate assembly gasket and mounting screws (if base mounted)
1	L-867 base (if base mounted)
1	Anchor stake PA2 (if stake mounted)
1	Conduit elbow (if conduit mounted)

1.4.2 Performances

The photometric performances are given in figure 4 and in table 4 (and figures 4 and 5)

RVE-3-045	Lamp wattage W	Colour	Photometric curve Fig.	Peak Intensity Cd	Performance: Average Intensity Cd	Performance: Beam spread Horiz.	Performance: Beam spread Vert.	FAA compliance	DOME code	Notes
Approach	45	white	5	340	235	360°	0°-11°	-	S	
	45	yellow	5	190	130	360°	0°-11°	-	S	
Threshold	45	green	6	700	480	-2-+7,5°	2°-7°	-	T	
	45	green	6	700	490	-1,5°+1,5°	1,5°-5,5°	L-861E	T	1
	30	green	5	45	30	360°	2°-10°	L-860E	S	1
Runway edge	30	white	5	200	135	360°	2°-10°	L-860 L-861	S	2
	30	yellow	5	110	75	360°	2°-10°	L-860 L-861	S	2
	45	white	5	340	280	360°	2°-10°	L-860 L-861	S	
	30	white	6	1950	1100	-2-7,5°	0°-7°	-	T	
	45	white	6	3200	2100	-2-7,5°	0°-7°	-	T	2
	45	yellow	6	1750	1150	2-7,5°	0°-7°	-	T	2
Runway end	45	red	6	380	250	-1,5-+7,5°	0°-4,5°	-	T	
	45	red	6	380	210	-1,5-+1,5°	3,5°-5,5°	L-861E	T	1
	30	red	5	25	15	360°	2°-10°	L-860E	S	1
Taxiway edge	30	blue	5	5	2	360°	0°-30°	-	S	
	30	blue	5	5	3	360°	0°-6°	L-861T	S	

Notes 1: bidirectional red/green/S or T coded, domes are available
2: bidirectional white/yellow, S or T coded, domes are available
3: with domes "S" coded, 45W lamp is only allowed in white and yellow colour. For all other colours use 30W lamp.

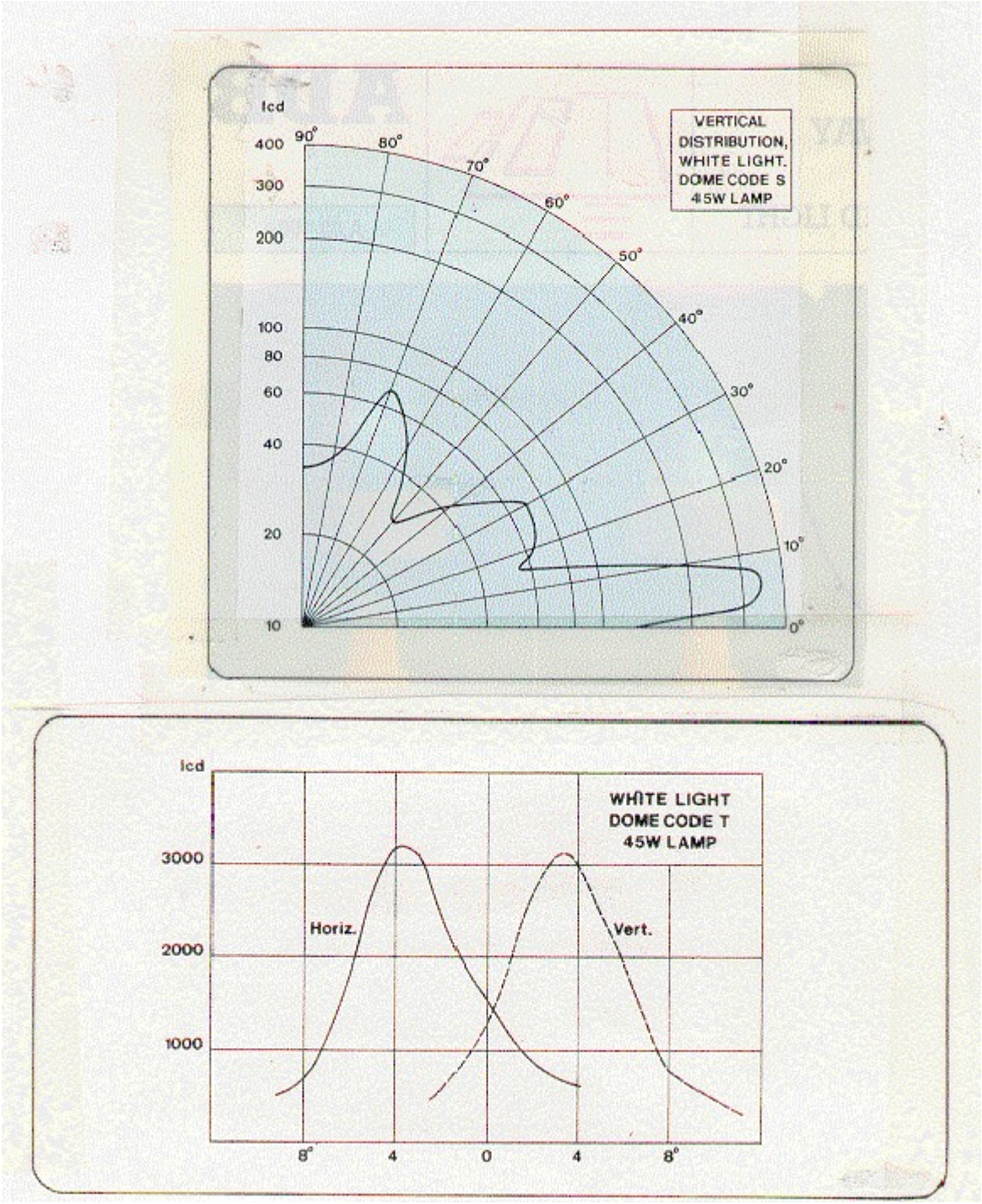
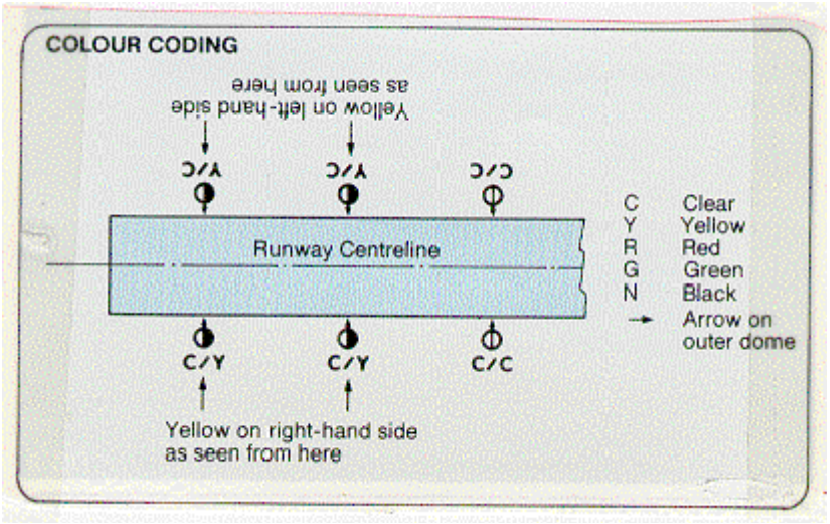


Fig. 4
RVE-3-045 - Photometric curve

1.5 COLOUR CODE FOR T-TYPE LENSES

Some of the T-type lenses have preferential beams with a given toe-in. Where two-colour lenses are used it is therefore indespensable to match the required lenses with their location on the runway.
The applicable convention for a correct ordering is given in Fig. 5 below.



Colour coding
Fig. 5

SECTION 2

MAINTENANCE

2.1. INTRODUCTION

Maintenance personnel should refer to the maintenance procedure described in the ICAO Airport Services Manual, Part 9, Airport maintenance practices and in FAA Advisory Circular N° AC150/5340-26, chapter 4, section 4.
The method of maintaining the RVE-3-045 Elevated Light consists only of a light assembly servicing in the field, limited to cleaning of outer glassware and to lamp and broken glassware replacement. If any lamp is out, the location of the fixture should be recorded and the lamp replaced at a time when the circuit is de-energised.

2.2 LAMP REPLACEMENT

De-energise circuit and lockout circuit.
Remove dome from fixture by loosening the two thumbscrews on the side of the fixture. Pull out lamp. Wearing clean, white, lintfree gloves, insert a new lamp into lamp socket and remove protective sleeving. Reinstall dome and tighten the two thumbscrews.

2.3 MAINTENANCE HINTS AND TIPS

2.3.1 Relamping

2.3.1.1 Make sure you are using the proper lamp.
Check P/N, watts and current as printed on lamp base.
Several aviation lamps of different ratings have the same outside appearance.

2.3.1.2 Never touch the quartz bulb with bare fingers.
Oil or grease may contaminate the surface of the bulb and in operation cause reduced performance and premature failure. If the quartz is accidentally handled, clean before operation with a cloth moistened with alcohol or methylated spirit.

2.3.1.3 It is a good precaution to check systematically the condition of the lampholder and the wiring at each lamp replacement. Signs of overheating are the result of poor electrical contacts. The degradation process is fast if no remedial action is taken in time.

2.3.1.4 Premature oxydation of lampholder contacts in highly corrosive or salt-laden atmospheres.
In some cases the problem has been cured successfully by coating the lamp pins and lampholder contacts with a silicone jelly such as DOW CORNING # 4 COMPOUND or similar.

CAUTION

Touching the lamp with bare fingers may seriously shorten the lamp life. If the lamp has been touched, clean with tissue moistened with isopropyl alcohol or methylated spirit.

2.3.2 Water

Build-up of condensation water in an elevated light is a normal process resulting from the temperature and pressure differentials during the ON and OFF cycles of operation.

However the lights are so designed that condensation water will drain away through the mounting stem and will be evacuated through one or two purpose-made holes located near the shearing groove.

IT IS ESSENTIAL TO MAKE SURE THAT THESE DRAINAGE HOLES REMAIN UNOBSTRUCTED

2.4 PREVENTIVE MAINTENANCE

Service life depends essentially on the respect of the preventive maintenance procedures. Table 6 List the maintenance task to perform to maintain the RVE-3-045 light operational at a maximum efficiency.

2.5 CORRECTIVE MAINTENANCE

Table 6 list the maintenance tasks.

2.5.1 Removal of a broken frangible stem

Use a 2" spanner applied on the hexagonal part of the stem above the thread to unscrew from the ground mounting device.
Dispose of the broken parts of the frangible base.

2.5.2 Replacement of a RVE-3-045

Use a 2" spanner applied on the hexagonal part of the base above the thread to unscrew from the ground mounting device.
Disconnect the plug from the receptacle.
Proceed as indicated in section 5. for installing a new RVE-3-045.

2.5.3 Dome maintenance

Remove the upper body losing the two thumb-screws.
Clean the blue dome with a liquid glass cleaner or a detergent solution.
Rinse thoroughly.

Replace by a new one if it shows signs of degradation.

2.6 SNOW REMOVAL

Snow-plough operators should exercise extra care not to strike the light fixture with snow-plough blades.
In regions where heavy snow falls can be expected it is recommended to mark the position of the RVE-3-045 lights by means of a small flag mounted on the fixture, in the dedicated hole.

Table 6 : Preventive and corrective maintenance tasks

Interval	Maintenance Task	Action
Daily	Lamp burned-out	Replace when system deactived See Section 2.2.
	Dimly burning lamp	Same as above
	Broken dome	Replace dome assembly
Weekly	Obscuration by vegetation	Remove. Use weed killer.
	Dirty lens	Clean with glass cleaner.
Monthly	Misaligned fixture	Straighten, level and align.
	Dirty lamp sockets	Clean when system is deactivated
	Dirty frangible coupling weep holes (stake-mounted fixtures only)	Clean
	Check drain holes for dirt	Clean
Semi-Annual-ly	Improper ground elevation	Grade so frangible point is approximately one inch above ground elevation
	Improper light elevation	Maintain elevation of all lights at same height

Table 6 : Preventive Maintenance Tasks (continued)

Semi-Annually	Moisture present in light housing or Replace if damaged.	Check drain holes & clamps. Check lens L-867 base for cracks Use waterpump to remove Water from base.
	Paint rusting or flaking off	Paint
Annually	Cracks, corrosion, shorts	Repair or replace
	Dirty contacts	Clean when system deactivated.
	Loose connections	Tighten
Unscheduled	Prediction of heavy snowfall	Mark location of fixtures (use red flags or sticks) to facilitate snow removal and lessen the chance of damage to fixtures by snow removal equipment.

SECTION 3

TROUBLESHOOTING

3.1. TROUBLESHOOTING GUIDE

The troubleshooting guide for the RVE-3-045 Taxiway Light is given in Table 7.

CAUTION

De-energise circuit and lockout circuit or regulator so that the circuit can not be energised by remote means before attempting to service fixture.

Table 7 : Troubleshooting Guide

Problem : Lamp will not energize

Possible cause	**Solution**
Defective lamp	Replace lamp
Loose connections	Tighten
Deteriorated wire insulation	Replace wires
Moisture present in fixture	Open up & dry. Inspect lens for cracks. Replace lamp and any damaged parts

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PARTS LIST

4.1. PARTS LIST

Table 8 lists parts ordinarily required for repair or replacement.

Table 8 : RVE-3-045 - Parts list

Item on Fig. 11	ADB Code	Qty/ Unit	Designation
1408.15.011		1	Omnidirectional Medium Intensity Elevated Light type
	1402.06.001		RVE-3-045-S
	1402.06.011		RVE-3-045-T comprising:
	N1402.06.000		- Light body
5	4070.88.882	1	* Lower body made of aluminium alloy with flagholder
6	4070.84.980	1	* Ball joint
7	4070.85.490	1	* Clamp for ball joint
10	7216.45.569	2	* Thumbscrew
10	7283.05.053	2	* Washer for thumbscrew
10	7080.38.680	2	* Swuare nut for thumbscrew
8	4070.84.992	1	* Stem, frangible
	1458.10.820	1	- 2-pole plug assembly consisting of
9	1458.10.810	1	* 2-pole plux moulded on two AWG16, 250mm long wires fitted with crimp-on and shrink sleeves.
3	6114.00.080	1	* Lampholder GY9,5 with leads (to be used with feeding leads and plug 1458.10.810)
4	6126.83.590	* Clamp for cable	
4	7283.05.060	* Retainer for clamp	

	Item on Fig. 11	ADB Code	Qty/ Unit	Designation
2	2990.40.830	1	MANDATORY	ADDITIONAL PARTS Halogen lamp - 30W - 6,6A - GY9,5 - 1000H
		2990.40.820		Halogen lamp - 45W - 6,6A - GY9,5 - 1000H
	1			Lenses * S-TYPE LENSES
		1480.03.295		- 360 deg. clear dome externally smooth
		1480.03.305		- 360 deg. green prismatic dome
		1480.03.315		- 360 deg. red prismatic dome
		1480.03.325		- 360 deg. yellow prismatic dome
		1480.03.405		- 360 deg. blue prismatic dome
		1408.03.335		- 180 deg.clear/180 deg.red prismtic dome
		1408.03.345		- 180 deg.red/180 deg. green prismatic dome
		1408.03.355		- 180 deg.clear/180 deg. yellow prismatic dome
		1408.03.365		- 180 deg.yellow/180 deg. red prismatic dome
		1408.03.375		- 180 deg.clear/180 deg. green prismatic dome
		1408.03.385		- 180 deg.green/180 deg. blanking
		1408.03.435		- 180 deg.red/180 deg. blanking
		1408.03.425		- 180 deg.yellow/180 deg. blanking
		1408.03.415		- 180 deg.clear/180 deg. blanking

Item on Fig. 11	ADB Code	Qty/ Unit	Designation
			* T-TYPE LENSES
	1408.03.095		- 360 deg.clear prismatic dome
	1408.03.105		- 360 deg.green prismatic dome
	1408.03.115		- 360 deg.red prismatic dome
	1408.03.125		- 360 deg.yellow prismatic dome
	1408.03.085		- 360 deg.blue prismatic dome
	1408.03.135		- 180 deg.green left/180 deg. red right prismatic dome
	1408.03.145		
	1408.03.155		
	1408.03.165		
3	xxxx.xx.xxx	1	Lampholder assembly Gy9,5 equipped with two leads, crimp-on terminals and heat shrinkable tubing. Used as spare part when using existing feeding wires fitted with the light.
	xxxx.xx.xxx	2	Aluminium spacers to mount lampholder (not on drawing)

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SECTION 5

INSTALLATION

5.1. INTRODUCTION

This section provides instructions for the installation of the RVE-3-045 Taxiway Light. Refer to the airport project plans and specifications for the specific installation instructions.

5.2 UNPACKING

The equipment must be handled carefully to prevent component damage. Unpack carton upon receipt and check the contents and their condition. Note any exterior damage to carton which might lead to detection of equipment damage.

5.2.1 Damage.

If damage to any equipment is noted, a claim form should be filed with the carrier immediately.
Inspection of equipment by the carrier may be necessary.

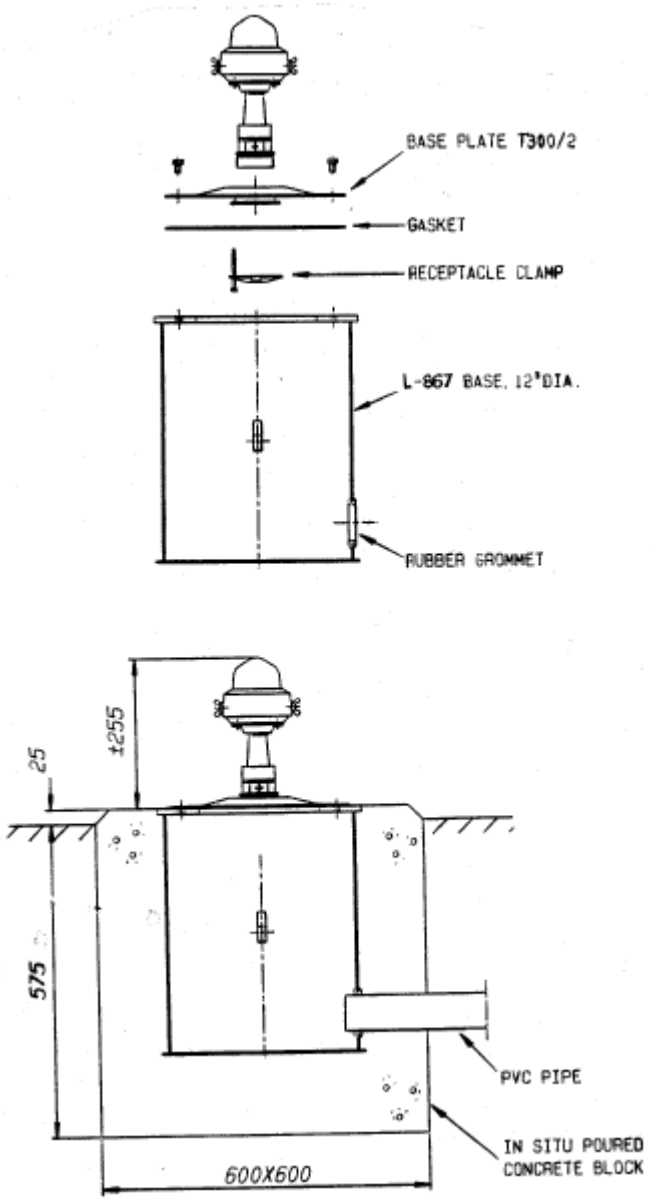

Fig. 5
RVE-3-045 mounted on a L-867 base : duct system

5.3 INSTALLATION CRITERIA

For the installation criteria we refer to the correspondant FAA standards, the ICAO design manual part 4 or the relevant STANAG specifications.

5.4. BASE MOUNTING

5.4.1 L-867 Base Installation.

The RVE-3-045 light fixture can be mounted on an L-867 base and mated with a base plate T300/2 whose diameter and bolt-hole circle correspond to the 12" L-867 base. The base plate is designed to receive the 2" - 11 TPI frangible stem. A gasket is used with the base plate to form a watertight seal between the base plate and the L-867 base. The procedures to install the L-867 base is given in manual AM.05.120e. Fig. 5 shows typical installation method on L-867 base. Figures 6 and 7 give other installation alternatives.

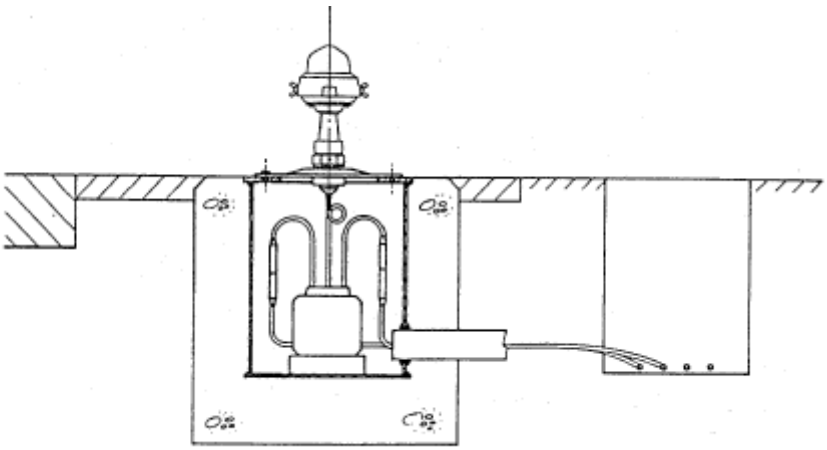

Fig. 6
RVE-3-045 mounted on a L-867 base : trench system

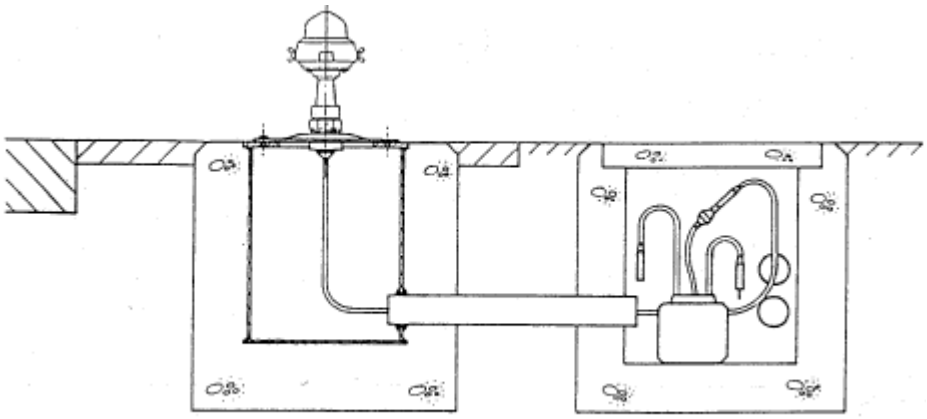

Fig. 7
RVE-3-045 mounted on a L-867 base and the transformer in a pit (the pit can also be replaced by a L-867 base) with cables in duct.

5.4.2 Installation of RVE-3-045 on light base.

See fig. 8 for typical wiring diagram.

5.4.2.1 Connect the primary series loop to the appropriate isolation transformer.

NOTE

Install transformer so that it is about 3 inches above the bottom surface of the L-867 base (use brick) to avoid the possibility of the transformer being partially immersed in case water accumulates under the level of the ducts or pipes.

5.4.2.2 Check the continuity of the series loop after the transformer has been connected.

5.4.2.3 Wrap the connector joints in the primary circuit with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape one-half lapped, extending at least 4 cm on each side of the joint.

5.4.2.4 Clamp the female secondary plug from the isolating transformer to the L-867 base plate fitting.

5.4.2.5 Bolt base plate T300/2 and base plate gasket to the L-867 base using six 3/8-16 UNC screws. Apply a drop of Loctite Grade AV to each bolt thread and use a torque wrench to torque bolts down to 11 Nm.

5.4.2.6 Connect the male L-823 plug from the RVE-3-045 light fixture to the female transformer plug in the base plate.

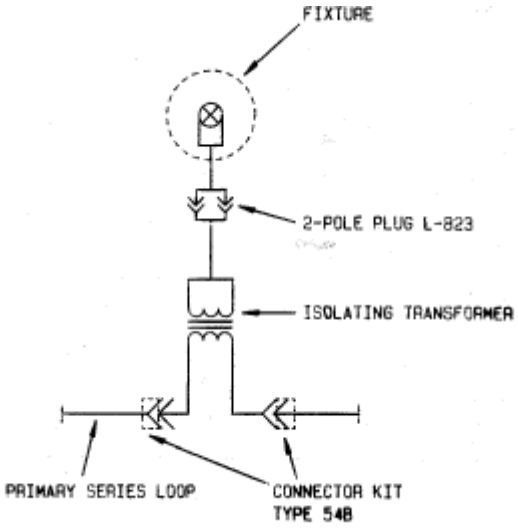

Fig. 8
Typical wiring diagram

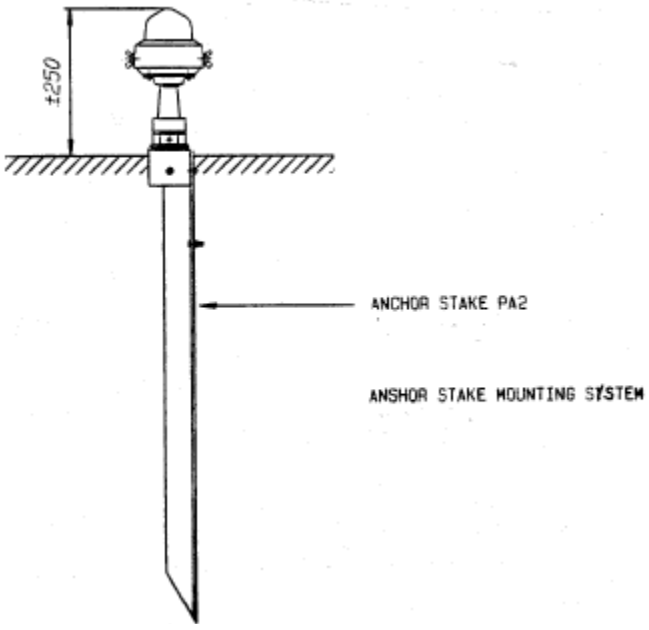

Fig. 9
RVE-3-045 : Stake mounting

5.4.2.7 Loosen the three ball-joint screws holding the frangible stem to the lower

body. Screw breakable stem on the female base plate thread.

5.4.2.8 Screw three ball-joint screws.

5.4.2.9 Level light fixture. See paragraph 5.7.

5.5 PA-2 STAKE MOUNTING

The RVE-3-045 light fixture is mated with a 760 mm long stake with a fitting attached at the top to receive the male thread of the frangible stem. Stake mounted RVE-3-045 taxiway lights use transformers, cables and connectors that are designed for direct earth burial or in a pit.

5.5.1 Install stake in a 15 cm diameter hole at a depth of 76 cm.

NOTE
Do not install stake by driving

5.5.2 Make electrical connections (Refer to 5.4.2.) and backfill around the stake with thoroughly compacted earth which has passed a 25 mm sieve.

NOTE
Backfill with concrete in case of unstable soil conditions

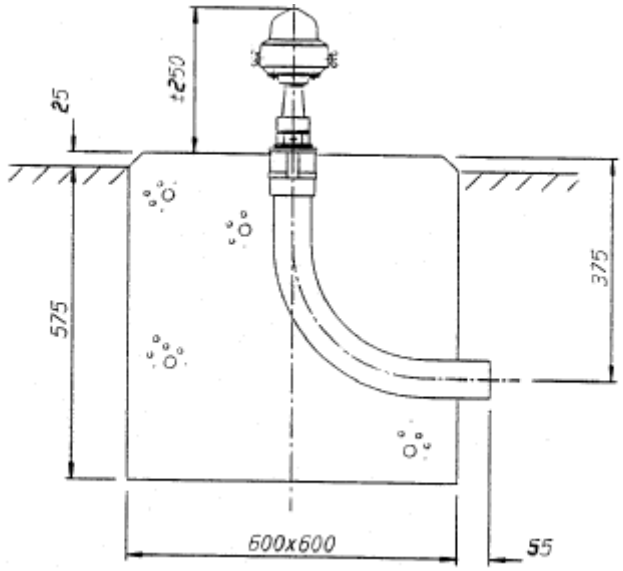

Fig. 10
RVE-3-045 : conduit elbow mounting

5.5.3 Install the top of the stake even with, or not more than 15 mm above the finished grade and maintain within 1 degree of the vertical.

NOTE

In areas where frost may cause heaving, anchor the stake with concrete and use a permeable backfill material such as sand around the buried electrical components and then cover the top surface with an imprevious material to reduce moisture penetration.

5.5.4 Insert the male RVE-3-045 plug into the transformer receptacle and install (avoid twisting the wires) the light fixture on the stake.

5.5.5 Level the light fixture. See paragraph 5-7.

5.6 TC-2 CONDUIT ELBOW MOUNTING

5.6.1 With this installation method the RVE-3-045 is mounted on 2" - 11 TPI tapped sleeve on the top of the conduit elbow which is encased in a concrete block as shown on fig. 10.

5.6.2 The transformers, cables and connectors are designed for direct burial or in a pit (or base).

5.6.3 Make electrical connection (Refer to 5.4.2).
ass the secondary cable through the conduit elbow. Let the receptacle rest on

the receptacle seat in adequate position.

5.7 SETTING

To level the light fixture, perform the following steps

5.7.1 Loosen the two thumbscrews and remove blue dome and lamp from the fixture.

5.7.2 Loosen the 3 ball-joint locking screws .

5.7.3 Place water level on top of the fixture, level the fixture placing water level parallel and perpendicular to the taxiway.

5.7.4 Tighten the 3 locking screws. To warrant structural integrity the setting screws need to be torqued at 3 Nm

5.7.5 Double check the levelling.

5.7.6 Replace dome and lamp.

CAUTION

Touching the quartz bulb with bare fingers may seriously shorten the lamp life. If the bulb has been touched, wipe it carefully with a piece of lens cleaning tissue or similar material moistened with alcohol or methylated spirit.

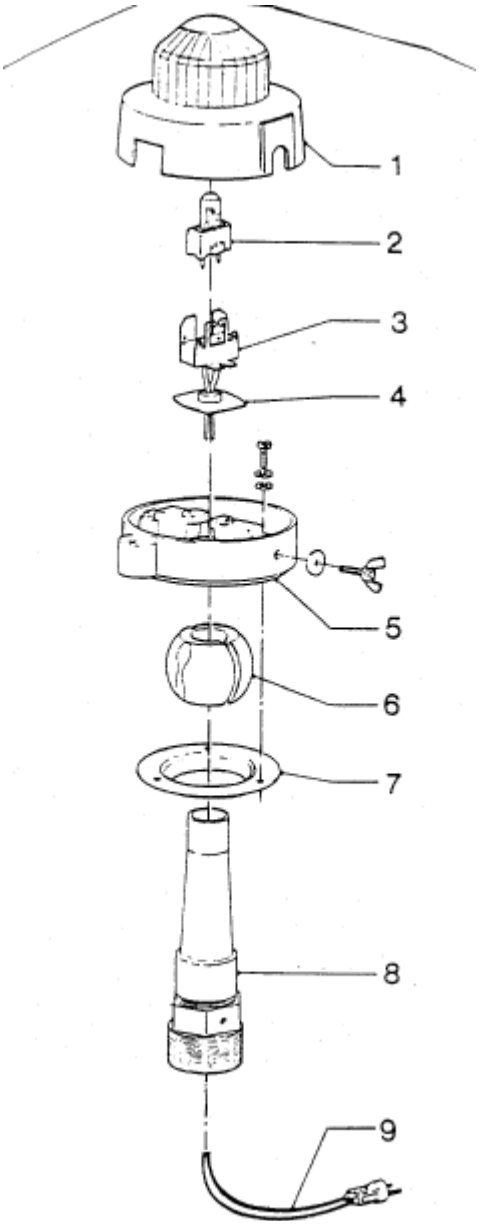

Fig. 11
RVE-3-045: Exploded view